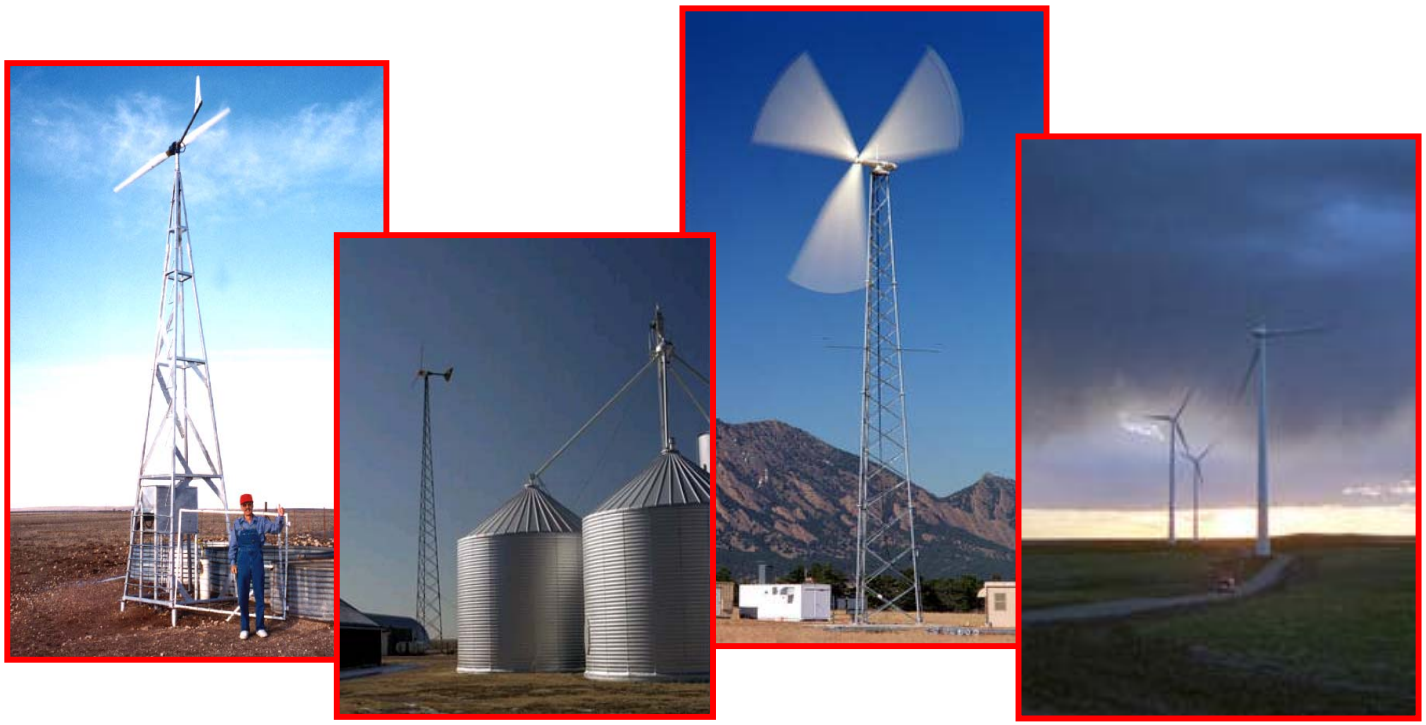
Wind Development & Policy Options



Donna Johnson

Pinnacle Technology

March 2004

Sizes and Applications

Small (≤10 kW)

- Homes
- Farms
- Remote Application

Intermediate (10-250 kW)

- Village Power
- Hybrid Systems
- Distributed Power

Large (660 kW - 2+MW)

- Central Station Wind Farms
- Distributed Power
- Community Wind

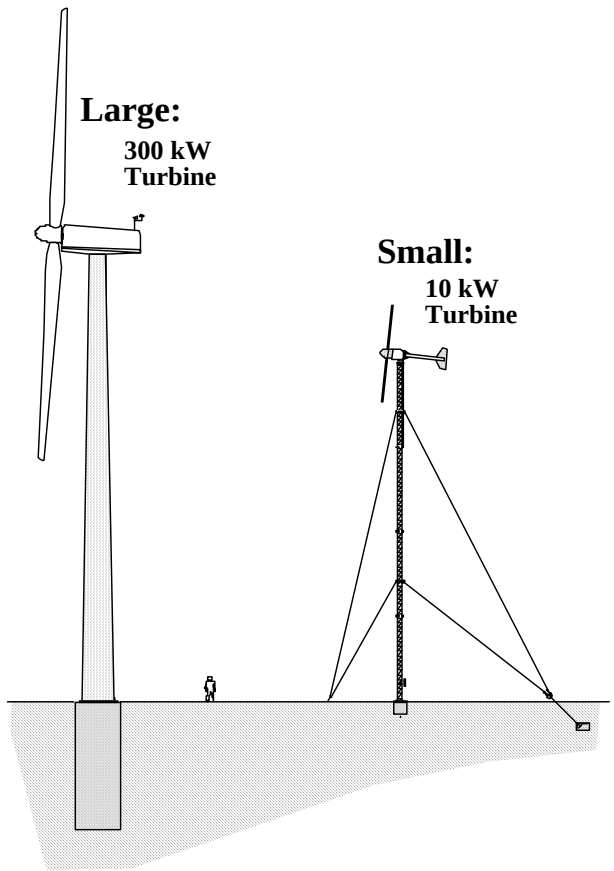
Large and Small Wind Turbines are Different

Large Turbines (500-2000 kW)

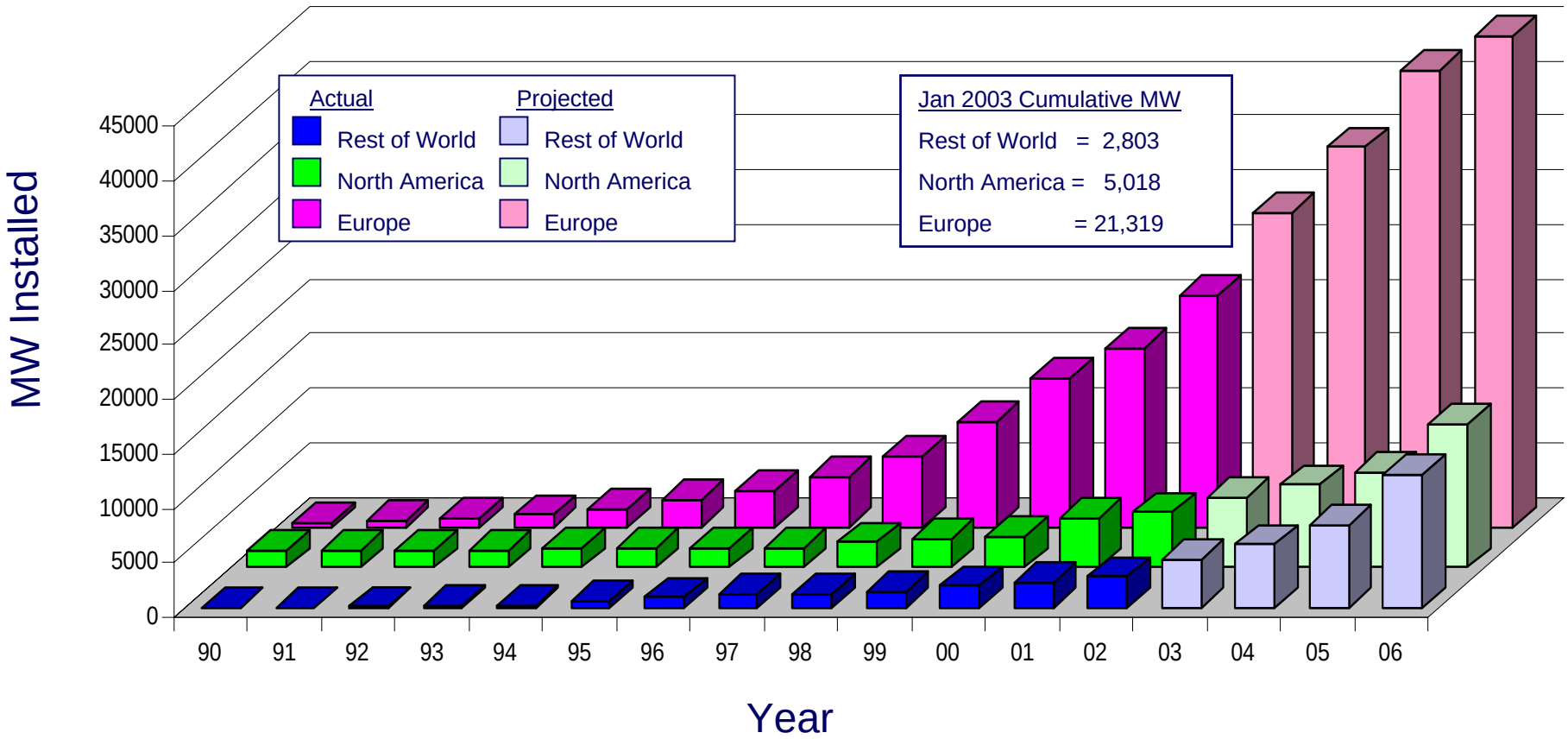
- Installed in "Windfarm" Arrays Totaling 1 - 100 MW
- $1,000/kW; Designed for Low Cost of Energy
- Requires 6 m/s (13 mph) Average Sites

Small Turbines (0.3-100 kW)

- Installed in "Rural Residential" On-Grid and Off-Grid Applications
- $2,500-5,000/kW; Designed for Reliability / Low Maintenance
- Requires 4 m/s (9 mph) Average Sites

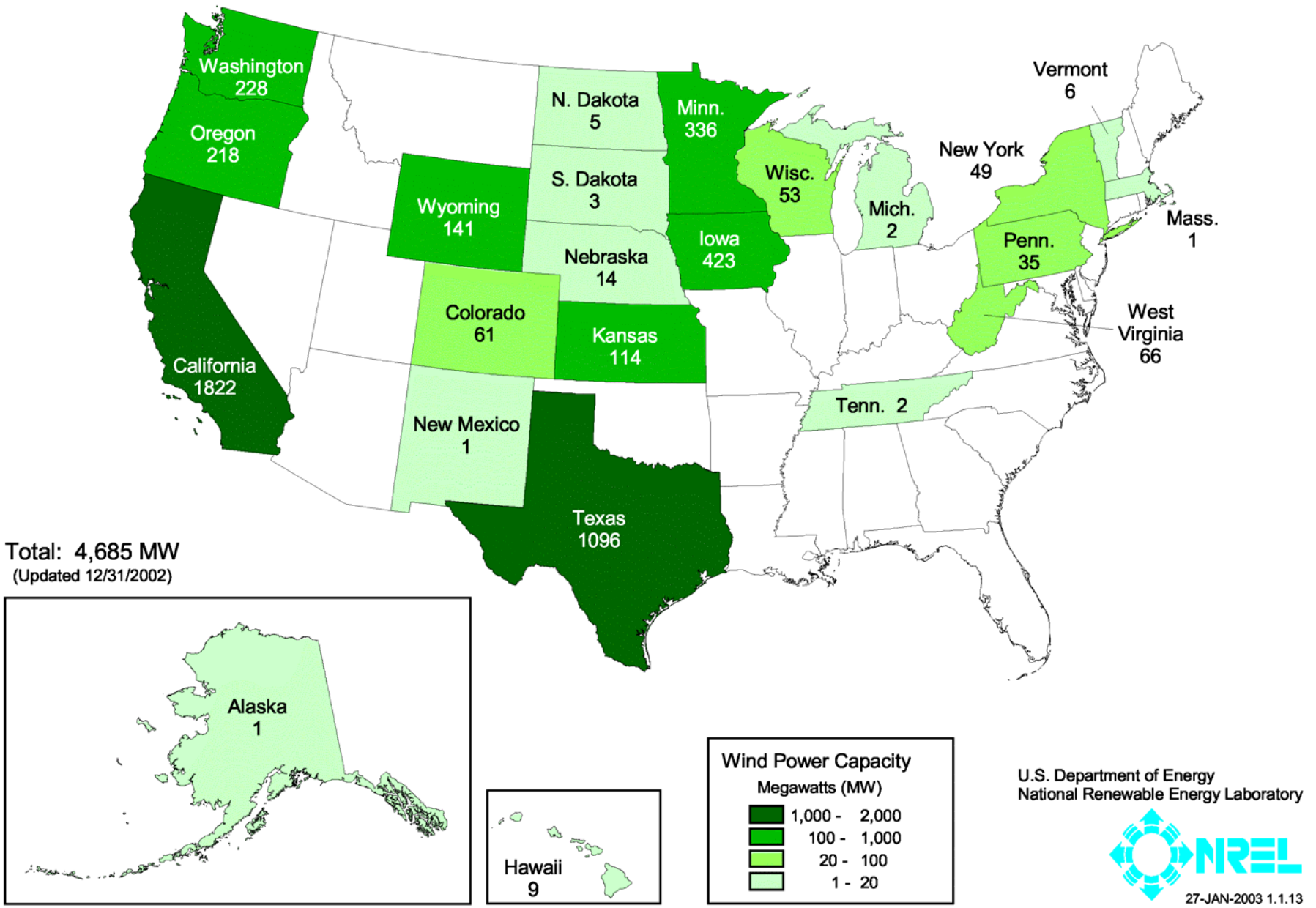


Growth of Wind Energy Capacity Worldwide



Sources: BTM Consult Aps, March 2001
Windpower Monthly, January 2003

United States - 2002 Year End Wind Power Capacity (MW)



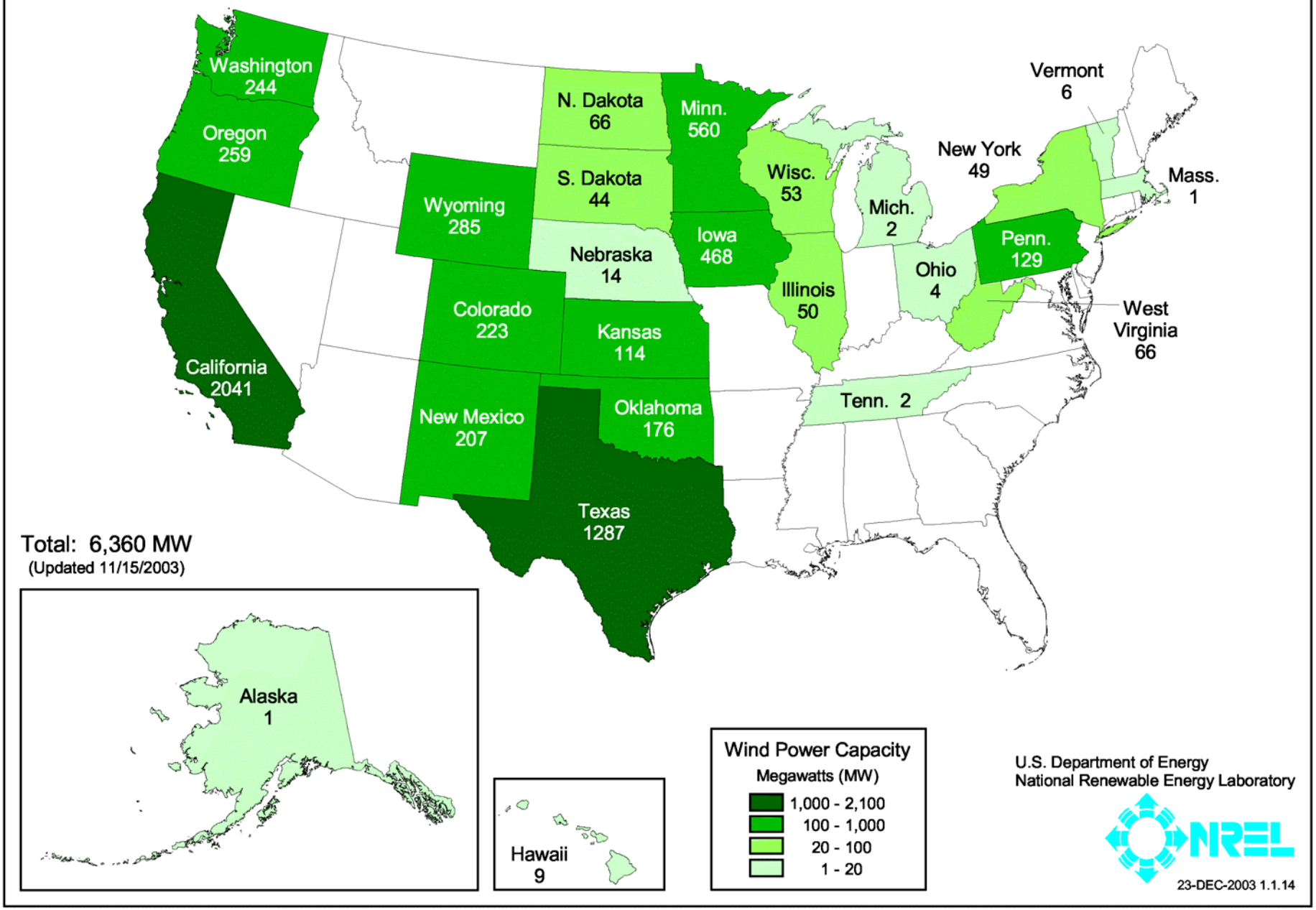
Total: 4,685 MW
(Updated 12/31/2002)

U.S. Department of Energy
National Renewable Energy Laboratory

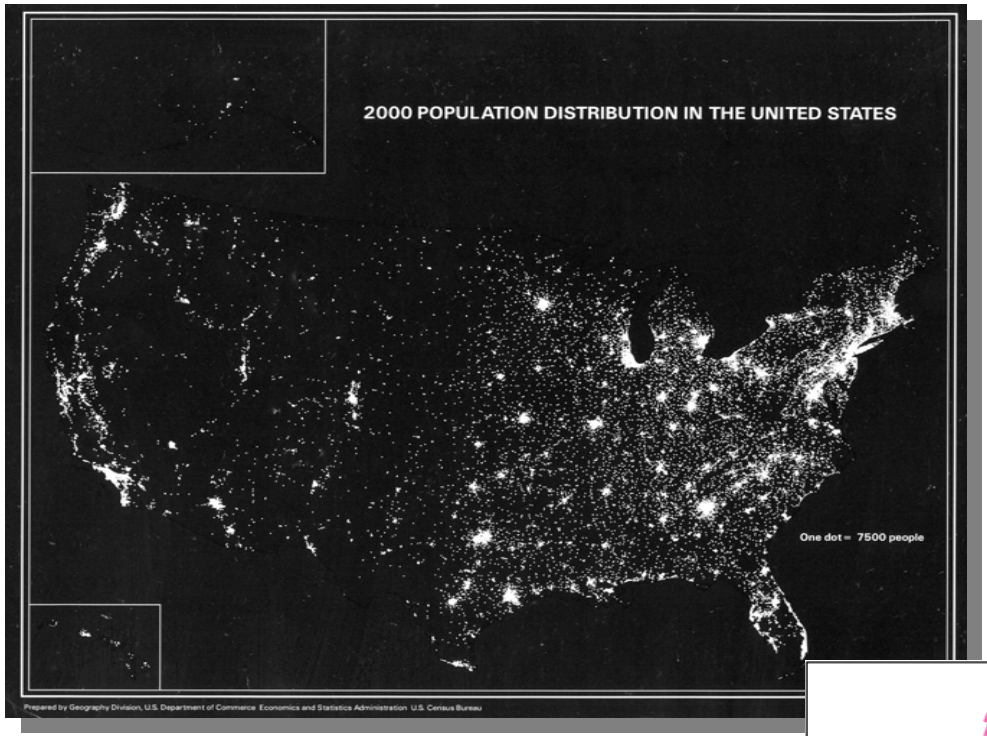
NREL

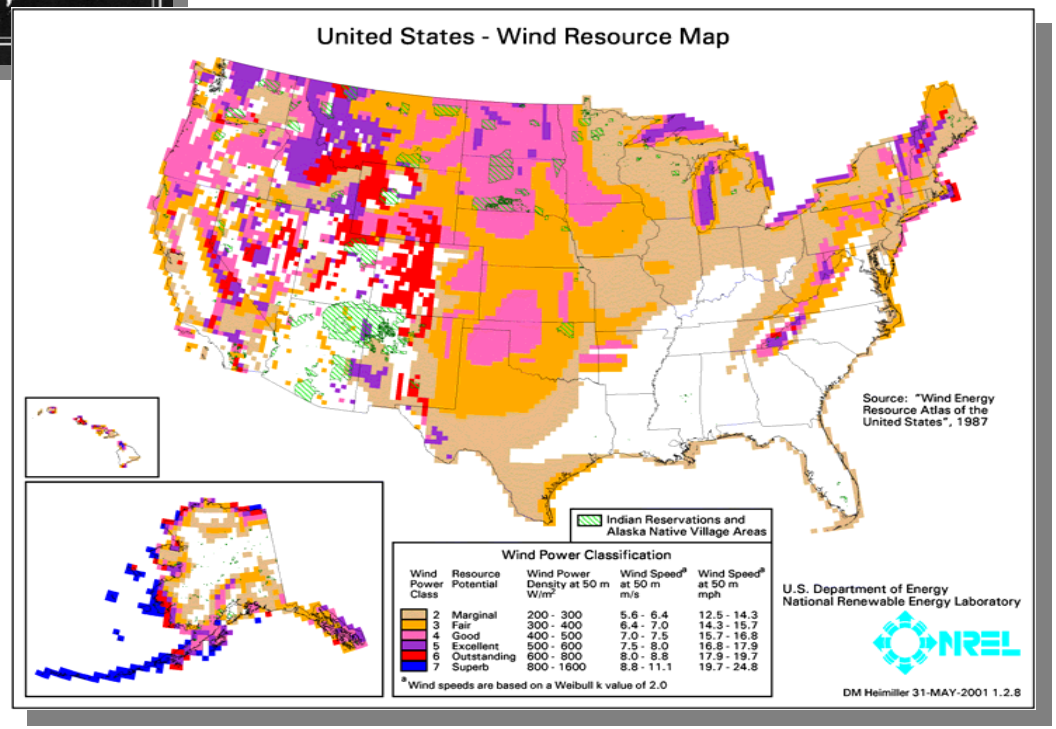
27-JAN-2003 1.1.13

United States - 2003 Expected Year End Wind Power Capacity (MW)

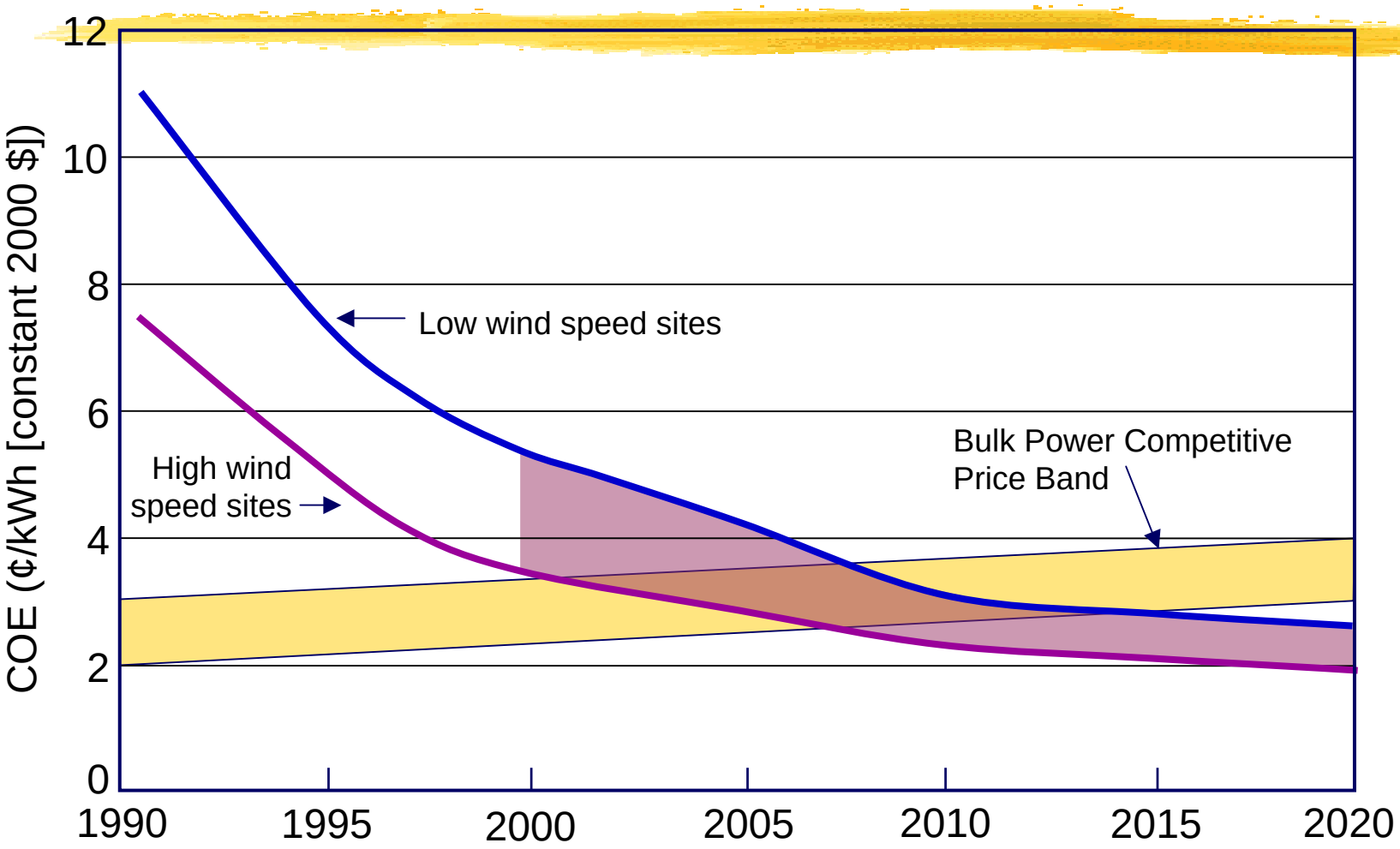


Population versus Wind Resources





Wind Cost of Energy



Drivers for Wind Power

- Declining Wind Energy Costs
- Fuel Price Uncertainty
- Federal and State Policies
- Economic Development
- Green Power
- Energy Security

Why Have a Renewable Public Policy?

- **Resource Diversity:** *plants of various sizes and technologies, dispersed throughout the state, lowers risks associated with unplanned outages & high required reserve margins*
- **Reduced Fuel-Price Risk:** *energy security and price stability*
- **Environmental Protection:** *reduced air emissions*
- **Sustainability:** *renewables do not deplete resources, nor are they susceptible to fossil fuel price increases*

Vermont Public Service Board - 1996

Current Policies in Kansas

FEDERAL

- Production Tax Credit expired 12/31/03 - $0.017/kWh
- Renewable Energy Production Incentive
- FERC 888

STATE

- Renewable Energy exempt from Property Tax
- 25kW homeowner or 100kW commercial systems will be paid 150% of utility's monthly system average cost
- Electric Generation Facility Siting - does not apply to renewable energy facilities that are 100 MW or less
- State Energy Program Grants

Four Different Wind Users - Each has Different Policy Needs

Homeowner

Produce Power Primarily for Own Consumption

Schools, Commercial, Farms, Churches

Wind Farms

Produce Power Primarily for Sale

Small Producers 1-5 MW

States Have Instituted a Wide Range of Policies

- Tax Incentives
- Direct Cash Payments
- Low Cost Capital Programs
- Distributed Resource Policies
- Customer Choice Opportunities
- Environmental Regulations
- Other Programs

Tax Incentives

- Production Tax Credits
- Investment Tax Credits
- Property Tax Reduction
- Accelerated Depreciation

Direct Cash Incentives

- Production Incentives
- Investment Incentives (Grants)

Low-Cost Capital Programs

- Government Subsidized Loans
- Project Loan Guarantees
- Project Aggregation

Distributed Resource Policies

- Standard Contracts for Small Projects
- Net Metering
- Line Extension Policies

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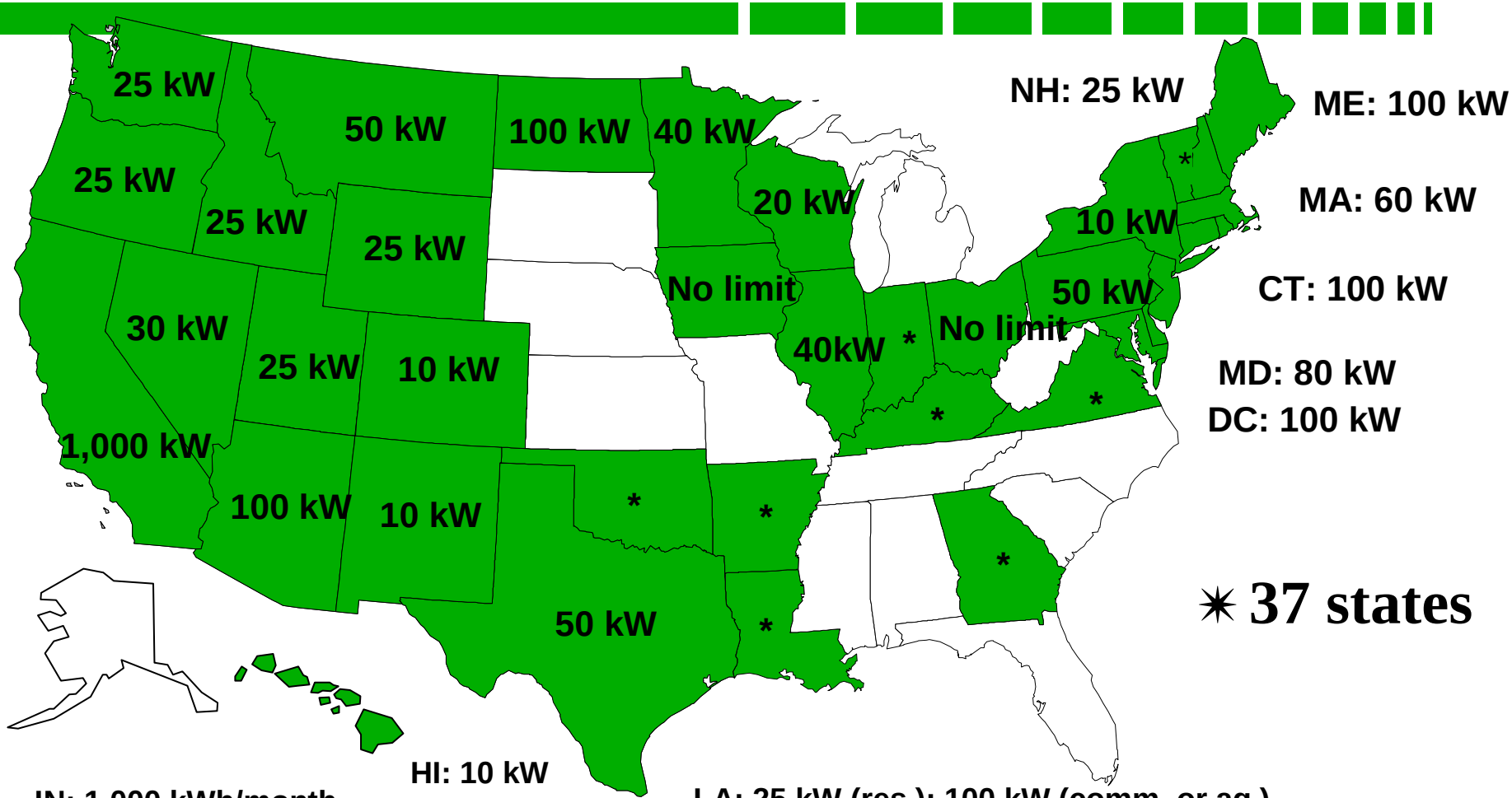
Net Metering Rules



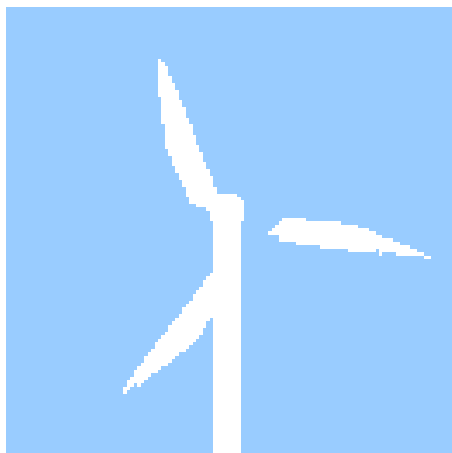
✷ 37 states

IN: 1,000 kWh/month
VT: 15 kW, 150 kW for farm systems
VA: 10 kW (res.);25 kW (comm.)
KY: 10 kW (res.); 25 kW (comm.)

LA: 25 kW (res.); 100 kW (comm. or ag.)
OK: 100 kW and 25,000 kWh
GA: 10 kW (res.); 100 kW (comm.)
AR: 25 kW (res.); 100 kW (comm. or ag.)

Customer Choice Opportunities

- Utility-Supplied Green Pricing Options
- Green Marketing from Retail Electric Sellers *(deregulated or renewable deregulation)*
- Aggregate Consumer Purchases *(deregulated)*
- Fuel Source Disclosure Requirements & Certification



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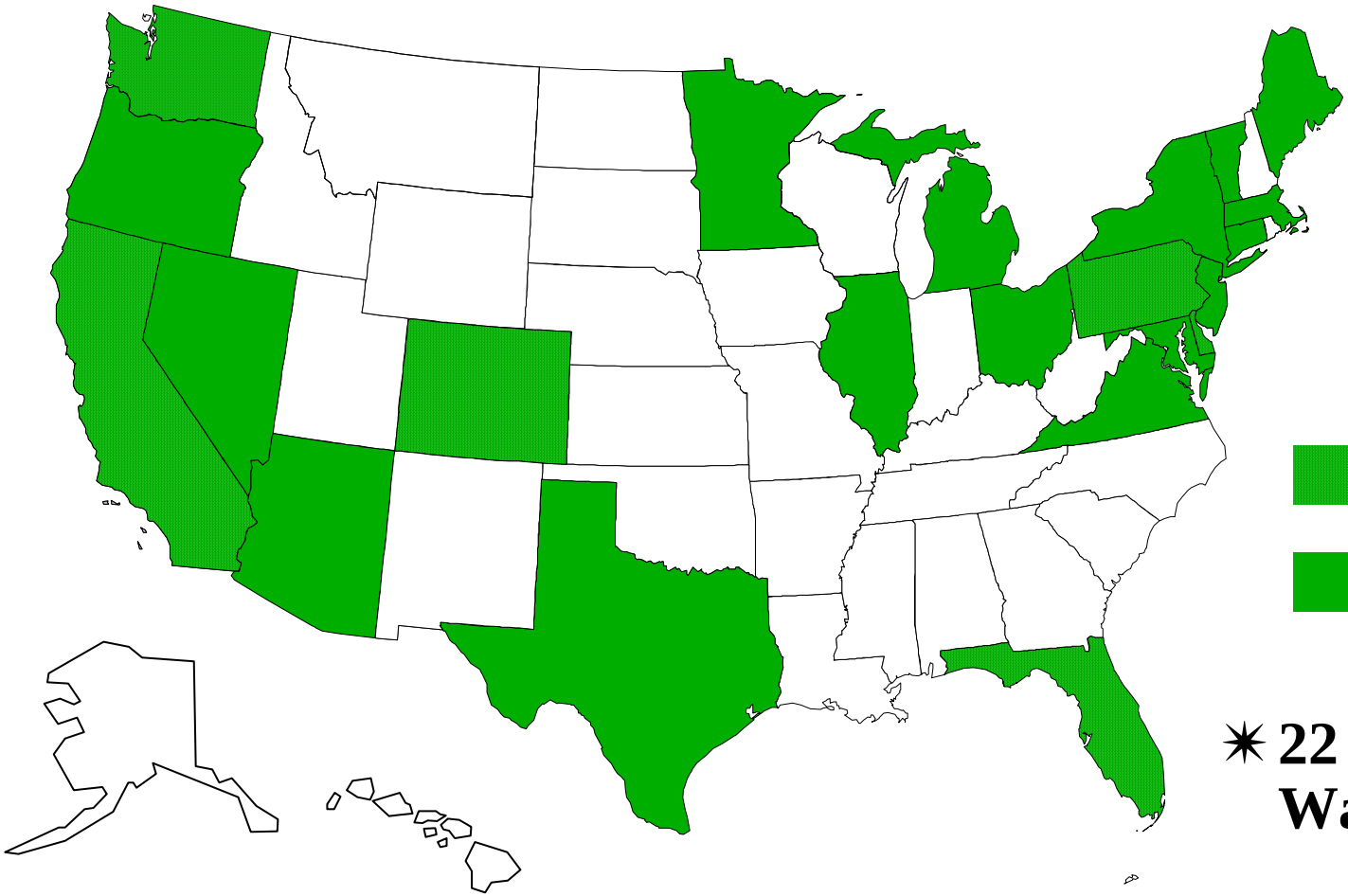
Fuel Mix and Emissions Public Disclosure



Fuel Mix Only

Both

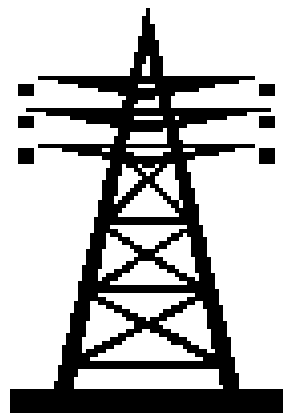
✷ **22 States + Washington D.C.**

General Environmental Regulation

- Externality Valuation in Resource Planning
- Externality Valuation in Environmental Dispatch
- Emissions Taxes
- Emission Caps/Marketable Permits

Other

- Government Purchases
- Site Prospecting, Review & Permitting
- Renewable Portfolio Standard
- Auctioned Contracts
- Performance Based Rate Making



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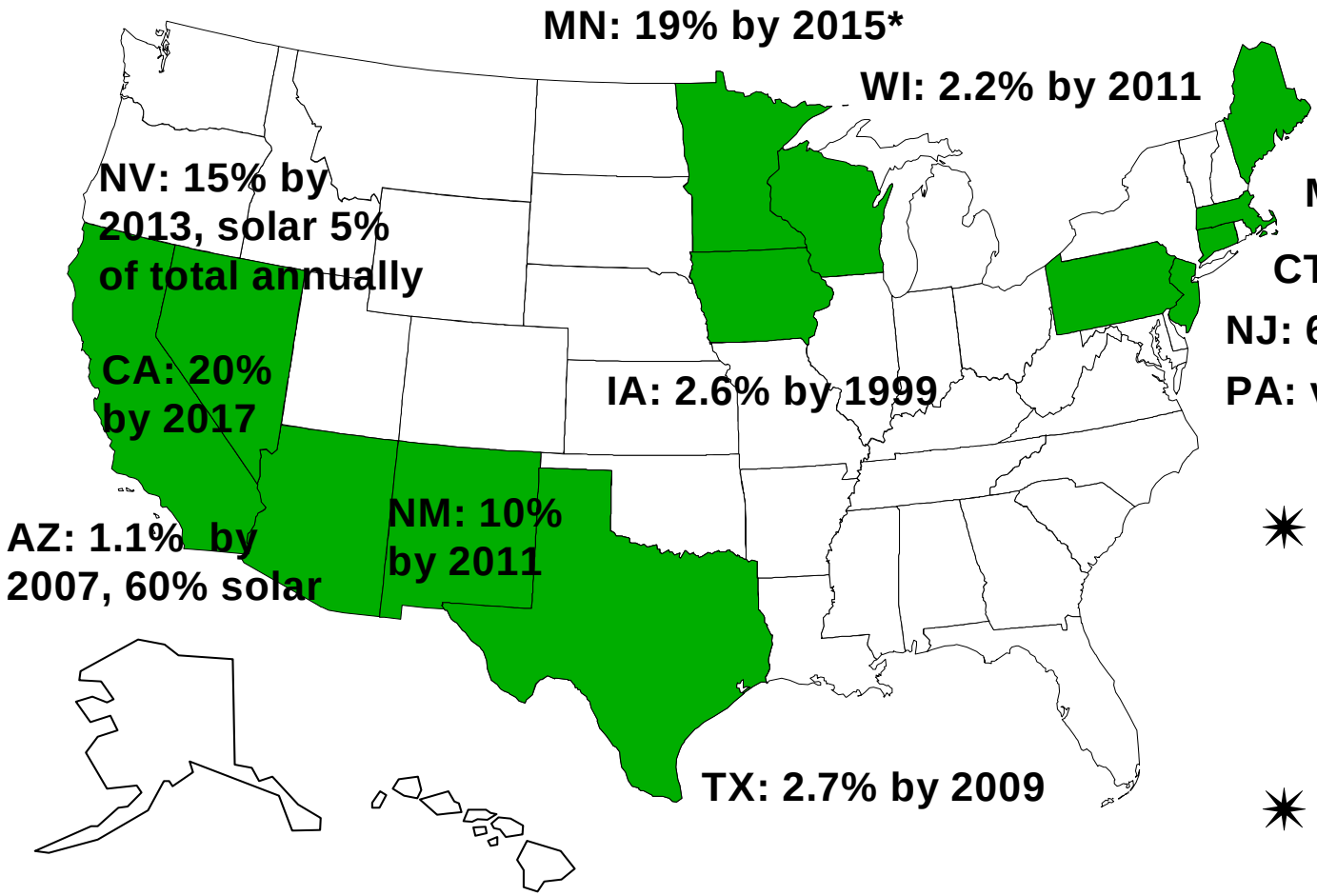
Renewable Energy Standards



- 13 states – CA, WI, IA, MN, NV outside of restructuring
- IL, NY up next?

* MN has a minimum requirement for one utility, Xcel.

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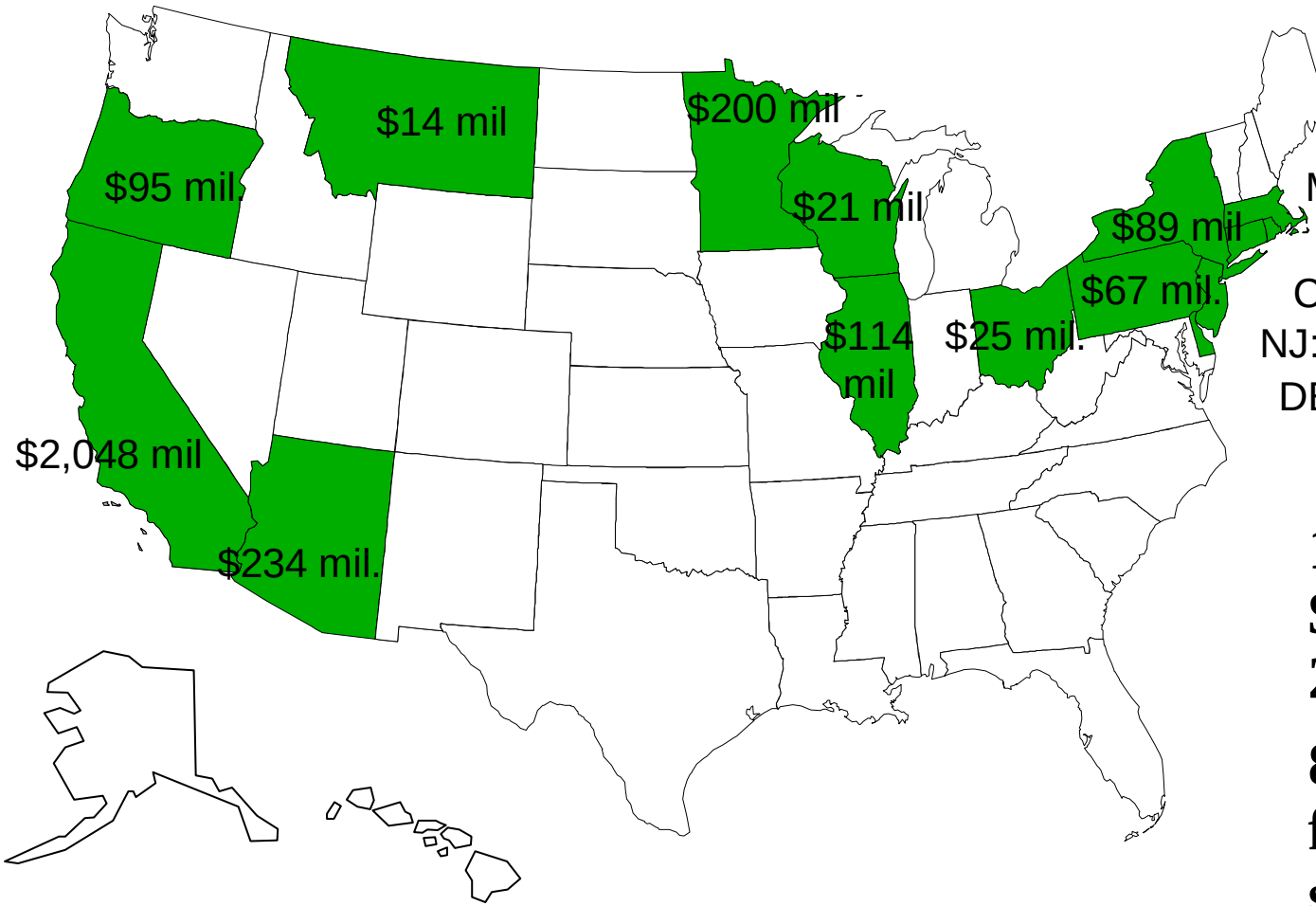
Renewable Energy Funds

Cumulative 1998-2017



MA: $494 mil
RI: $30 mil
CT: $248 mil
NJ: $286 mil.
DE: $18 mil.

15 state funds = $4 billion by 2017

8 states with funds & standards

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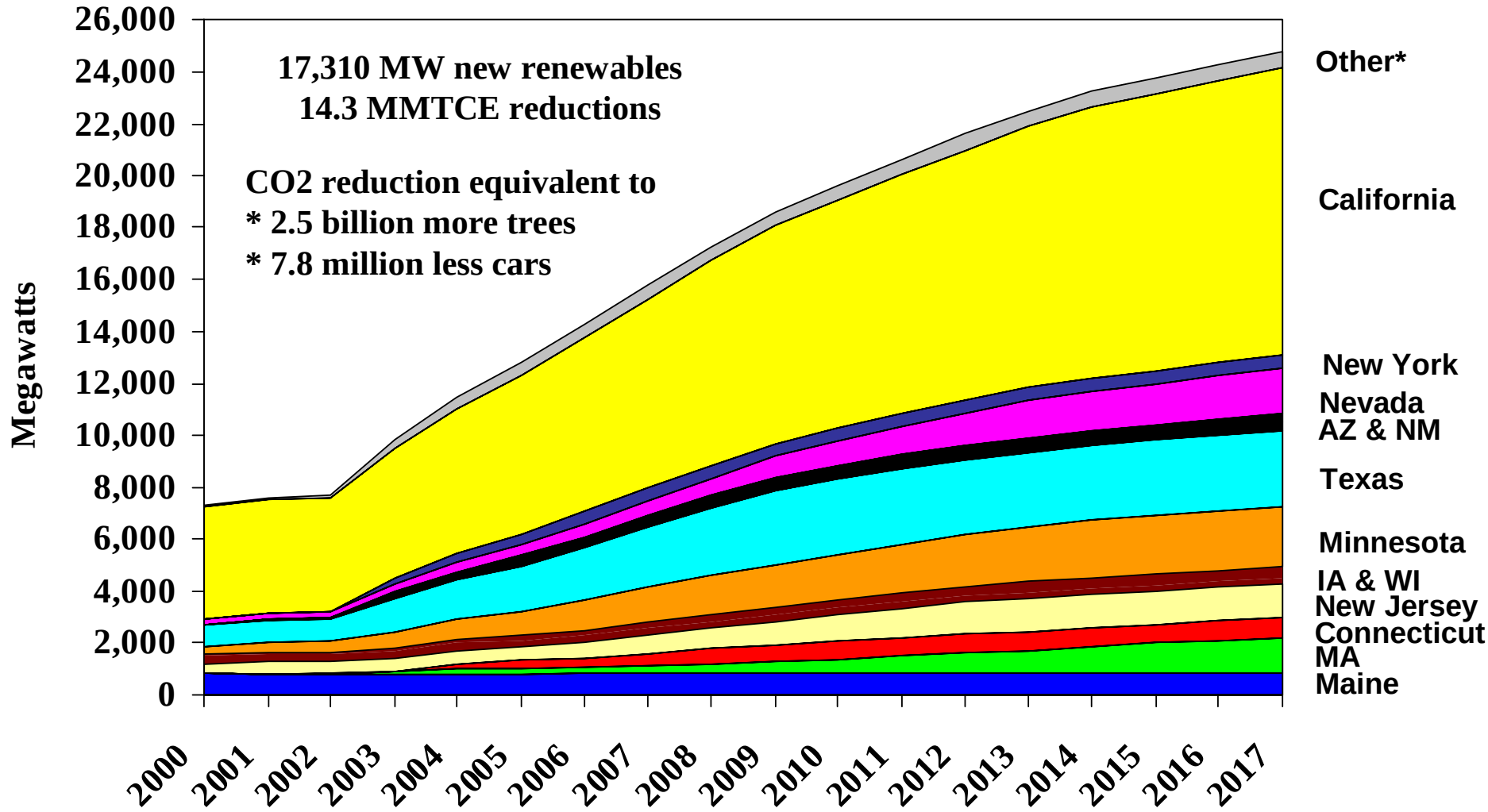
Renewable Energy Expected From State Standards and Funds



*Includes Illinois, Montana, Oregon, Pennsylvania and Rhode Island.

Contact Information

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